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(54) **METHOD FOR PREPARING SEMICONDUCTOR DEVICES APPLIED IN FLIP CHIP TECHNOLOGY**

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(57) **ABSTRACT**

A method for preparing semiconductor devices in a flip chip process comprises forming deep grooves surrounding each of the semiconductor chips; depositing a first plastic package material to form a first plastic package layer covering front surface of the semiconductor wafer and filling the deep grooves; depositing a metal layer at back surface of the semiconductor wafer after grinding; grinding an outermost portion of the metal layer thus forming a ring area located at back surface around edge of the semiconductor wafer not covered by the metal layer; cutting the first plastic package layer, the semiconductor wafer, the metal layer and the first plastic package material filled in the deep grooves along a straight line formed by two ends of each of the deep grooves filled with the first plastic package material; and picking up the semiconductor devices and mounting on a substrate without flipping the semiconductor devices.